

**CRYSTALIN RESEARCH PVT LTD – A PHARMACEUTICAL SOLID-STATE INNOVATION R&D LABORATORY**  
**CHALK2SALT MOTTO – TO THICKEN THE PIPELINE OF NEW DRUGS LAUNCHED IN THE MARKET PLACE**

**The Problem Facing the Pharmaceutical Industry**

About 80% of drugs are marketed as tablets and over 90% new drugs discovered in the last decade have polymorphs or hydrates. Over 50% of lead drug candidates fall off in R&D pipeline due to PC-PK-PD problems of low solubility and bioavailability, lack of stability in the pH/ temperature/ humidity range, difficulty of filtration, tablet compression, etc. Many drugs are marketed as a mixture of polymorphs and/or in variable hydration states and this creates inconsistent drug activity and composition for regulatory authorities.

**The Answer is Pharmaceutical Cocrystals**

A pharmaceutical cocrystal (PCC) is a hydrogen-bonded molecular complex of fixed stoichiometry between an API (drug molecule) and a coformer (CCF) selected from the GRAS/ EAFUS list of chemicals.



**How the Problem Started?**

With ever increasing number of patents being filed on closely related drug molecules, pharmaceutical companies are manipulating more complex molecular scaffolds, multi-functional molecules, and sensitive and/ or chiral centers, etc. to navigate the available patents space. These molecular features at times make it difficult to make salts, the most common method employed to increase solubility, stability and filterability of drugs. So what is the solution?

**Advantages of Pharmaceutical Cocrystals as ICEs**

The emphasis in the pharmaceutical industry has shifted from NCEs to ICEs (Improved chemical entities) to face the challenges in the current decade of patent cliffs. Pharmaceutical cocrystals will offer new improved medicines of drugs which were left aside in the past because of difficulties in salt formation due to (1) fragile sensitive chiral center in molecule, (2) degradation of drug in salt forming conditions, (3) lack of ionizable acidic/ basic functional groups at physiological pH, etc.

**Case Studies**

- Stability improvement and control of discoloration in cocrystal of anti-cancer drug Temozolomide
- Fast dissolution rate of polymorph and cocrystal of Indian herbal ingredient Curcumin
- Improved dissolution of FDC of anti TB drugs Pyrazinamide and Isoniazid eutectic
- Solubility enhancement in amorphous form and crystalline salts of anti-psychotic Olanzapine

**Milestones**

- The Company started in the Technology Business Incubator Lab at University of Hyderabad in 2010
- UK-India BioPharm Business Challenge Award in 2010 for Chalk2Salt Innovation in Pharmaceutical Cocrystals
- IKP Knowledge Park Millennium Conference Award in 2011 for Curcumin Cocrystals and Polypill Innovation
- Started Pre Clinical Trials of Anti-Cancer Drug Cocrystals in 2012 with BIPP funding support